

REMARKS

Summary

Claims 1-9 were pending and all of the claims were rejected in the Office action. The Applicant has carefully considered the references and reasons advanced by the Examiner, and respectfully traverses the rejections in view of the discussion presented below.

Claim Rejections

35 U.S.C. § 103 (a)

Claims 1, 2, 7 and 8 were rejected under 35 U.S.C. § 103 (a) as unpatentable over Lin (US 6,074, 767; "Lin") in view of Gill et al. (US 5,508,866; "Gill"), Rottmayer et al. (US 6,201,673; "Rottmayer"), Tanaka et al. (US 5,508,833; "Tanaka") Ohyama et al. (US 5,699,213; "Ohyama") and Soeya et al. (JP 05-135531 A; "Soeya"). The Applicant respectfully submits that the Examiner has not made out a *prima facie* case of obviousness.

Claim 1 recites, *inter alia*, soft magnetic layers fill recesses in the free magnetic layer wherein a thickness of said soft magnetic layers exceeds a depth of the recesses.

The Examiner notes that Lin fails to disclose the limitation "wherein a thickness of said soft magnetic layers exceeds a depth of the recesses, but that Gill "provide[s] evidence that the thickness of the soft magnetic 'seed layers' can exceed the depth of the recess...", citing Fig. 7, layers 74 and column 7 line 37 bridging column 8, line 14). The Applicant respectfully submits that Gill does not teach recesses, and that any such inference drawn by the Examiner is not

supported by Gill's written description of Fig. 7 or by a proper interpretation of Fig. 7.

Since these issues have been raised previously, the Applicant restates and elaborates on the traverse, without in any way withdrawing the previous arguments.

The Examiner interprets the dotted line between elements 74 and 75 of Fig. 7 and the associated written material in Gill as defining a recess in element 75, a cross-sectional surface of which is said to be observable at the ABS of the reproducing head structure 70. A review of Gill's drawings reveals that Fig. 7 is the only place where a dashed line is used in a drawing of a magnetic head. According to the MPEP (unlabeled figure preceding § 608.02 (a)), a dashed line in a physical structure is a hidden line. (When a dashed line is used in Fig. 1, it is an imaginary line showing the physical relationship between two views of the slider 13).

Whatever structure the dashed line in Fig. 7 represents must be hidden and is thus not visible from the ABS; there is no information in any figure regarding the distance behind the ABS where the structure represented by the dashed line starts. This means that the MR layer 75 extends upward at the ABS until it contacts the longitudinal bias layer 77 (at about the level of the top of the insulating layer 83). Such an interpretation of the drawing would be made by one skilled in the art, not having access to the descriptive text. The Examiner's interpretation of the drawing as showing a recess, present on the ABS surface, constitutes a reading of the arrangement of the present Claim 1 into the reference drawing. Such an interpretation is in conflict both with the drawing itself, and with the teachings of Gill, as is discussed below. The Applicant respectfully submits that Fig. 7 cannot be construed to teach the recess of the arrangement of Claim 1, and which the Examiner acknowledges is not taught by Lin.

The Applicant also respectfully traverses the Examiner's interpretation of the teaching in Gill (col. 7, line 37, bridging col. 8, line 14) as supporting the interpretation of Fig. 7 proffered in the Office action. There is no description of, or suggestion of, a recess deliberately formed in the MR layer 75. This can be concluded from the description of the manufacturing process:

The NiO/NiMn dual exchange-coupled biased MR sensor 70 is fabricated using R.F. or DC sputtering techniques. ... [T]he sensor active region layer structure NiO/NiFeNb/Ta/NiFe/Ta is deposited sequentially. Next, the sensor end region 76 is defined by photolithography and subtractively processed, such as by ion milling or etching, for example, to remove the thin Ta cap layer to expose the NiFe MR layer at the end regions. The longitudinal bias layer 77 is deposited in the sensor end regions 76 in physical contact with the MR layer 75 over a thin seed layer of 74 of NiFe (Gill, col. 7, lines 55-67) [emphasis added]

Further, "the NiMn longitudinal bias layer 77 including a seed layer 74 of NiFe...is about 350 Å thick...." (Id., col. 8, lines 18-21).

What Gill teaches is that the Ta cap layer 83, which originally covered the entire width of the MR layer 75, is ion milled or etched away such that an end region 76 of the MR layer 75 is exposed. Next, a longitudinal bias layer 77 (which includes a seed layer 74) is deposited on the MR layer 75 in the end region 76. Nothing in Gill suggests the desirability of forming a recess in the free magnetic layer, much less a recess of an optimized size for any purpose whatever. The seed layer 74 is described as "thin", and its function is as a "seed layer". The function of a seed layer is to facilitate, in some manner, the joining of two other layers.

The use of Gill as a reference, which is said to teach a recess formed in the MR layer, is equivalent to the Examiner's previous reliance on Rottmayer. In

the Office action of September 2, 2004, at page 8, the Examiner acknowledges that Rottmayer does not teach the formation of recesses in the free magnetic layer except in an incidental and uncontrolled fashion, and the same argument is made here; Gill does not teach the formation of recesses, only that the cap layer is removed by a process such as ion milling or etching to expose the MR layer. Hence the formation of a recess, much less a recess of controlled depth, in the MR layer is not taught by Gill.

Rottmayer (col. 8, line19-24) teaches that:

[T]he exposed portion of the capping layer ... is etched ... The etching preferably stops just after the top ferromagnetic layer ... is exposed. In a preferred embodiment [the step] includes ion milling the capping layer.

The Examiner has acknowledged that such a description in Rottmayer "fail[s] to explicitly describe a recess being formed in the free magnetic layer beyond what one of ordinary skill in the art would readily accept as "machine tolerance" when performing the known technique of etching/ion lithography." (Office action, September 2, 2003, page 8). Since etching/ion lithography are the manufacturing methods preferred by both Gill and Rottmayer to expose the MR layer, a similar conclusion as to the structure which results from the process must follow.

Thus, the recess in the arrangement of Claim 1 is not taught or suggested by Gill or any of the other references cited and, as not all of the elements of Claim 1 are found in the references cited, a *prima facie* case of obviousness has not been made out.

Claims 2-9, being dependent on and further limiting Claim 1 are, without more, allowable.

The Applicant respectfully submits that the claims as now presented are not obvious in view of the references cited, and are in condition for allowance.

Conclusion

Claims 1-9 remain pending.

For at least the reasons given above, the Applicant respectfully submits that the pending claims are allowable.

The Examiner is respectfully requested to contact the undersigned in the event that a telephone interview would expedite consideration of the application.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Anthony P. Curtis', is written over a horizontal line.

Anthony P. Curtis, Ph.D.
Registration No. 46,193
Agent for Applicant

BRINKS HOFER GILSON & LIONE
P.O. BOX 10395
CHICAGO, ILLINOIS 60610
(312) 321-4200